



Directions:

Your group will conduct an experiment where you will compare the **thrust** (*the power to push forward or up*) made by a long **exit nozzle** and a short **exit nozzle** (*a tube-shaped extension that accelerates the exhaust engines from a motor*).

1. Write a question that you can use to investigate the change of thrust resulting from the length of the exit nozzle.



2. Write an "if/then" statement or hypothesis that predicts an answer to your question. (For example, if the exit nozzle is longer, then the thrust will decrease.)

3. Roll the construction paper or folder so that it is a long tube (30 to 45 centimeters in length). Measure the length of the tube/nozzle and record it on the data chart below. Tape the nozzle to the hair dryer with electrical tape so that air can only escape if it moves to the end of your paper tube. Use transparent tape to tape the paper to make the tube.

4. Go to an open space with a smooth floor for your test. Take a cotton ball and place it on the "starting line" identified by a line of masking tape. Use the cool setting on the hair dryer and aim at the cotton ball. Do not allow the hair dryer to cross the starting line. Continue to aim the dryer at the cotton ball until the cotton ball stops moving.



How does the long exit nozzle affect the cotton ball's movement?

5. Place a piece of masking tape marked "1" (representing your first trial) on the floor where the cotton ball stopped.
6. Repeat steps 4 and 5 two more times. Mark the spots for trials 2 and 3, measure the distances, and enter the results in the second column of the chart below.

Long Exit Nozzle Length is _____ cm	Distance the cotton ball moves (Meters)	Short Exit Nozzle Length is _____ cm	Distance the cotton ball moves (Meters)
First Trial		First Trial	
Second Trial		Second Trial	
Third Trial		Third Trial	
Add the Distances	=	Add the Distances	=
* Average the Distances (Sum above ÷3)	=	* Average the Distances (Sum above ÷3)	=

7. Remove the long paper tube from the hair dryer. Fold a piece of construction paper so that it is a short exit nozzle. Repeat the same experiment as in step 6, this time recording the results in the last column of the chart.
8. Describe what happened in this activity.

9. What do you think may have caused the differences in the distances of your various trials?
10. Write a conclusion statement that answers your question (from #1) and uses the results that you obtained from the chart.
11. Compare your findings with other groups or pairs. If results were different, what variables or factors could explain these differences?